# Monitoring Glucose Control

**I. Self-Monitoring of Blood Glucose (SMBG)**

*A. Critical element in management of diabetes*

*B. Note for comparing plasma, whole-blood (capillary), and venous glucose:*
Serum and plasma glucose levels measured in most clinical labs can be 10-15% higher than whole-blood levels measured by some home monitoring equipment.

*C. Methods*
Blood glucose meter: usually performed by placing droplet of whole blood on reagent strip. Meter then provides a digital glucose reading. Meters available in wide variety of models and price ranges. Results may be influenced by hematocrit, altitude, temperature, and use of oxygen.

**II. Frequency of Testing**

***A. Determining factors***

1. Type of diabetes
2. Levels of control preferred
3. Ability to perform test independently
4. Affordability
5. Willingness to test (i.e., at school, work, etc.)

***B. General Guidelines***

1. Type 1: four times/day before meals and bedtime
2. Type 2: as needed to achieve glycemic goals
3. Gestational Diabetes (GDM): fasting and 1-2 hours after meals
4. Physical activity: before and after to determine effect on metabolic control (in type 1 and type 2 if needed)
5. Hypoglycemia: determine presence of hypoglycemia and response to treatment
6. Illness: every 4-6 hours
7. Insulin pump or intensive management: four or more times/day

**III. Normal and Target Plasma Blood Glucose Levels (mg/dl)***

| Biochemical Index | Normal | Goal | Additional Action Suggested |
|---|---|---|---|
| Average preprandial glucose (mg/dl)† | 70-110 | 90-130 | <90 |
| Average postprandial glucose (mg/dl)† | 70-140 | <180 | |
| A1C (%) | <6 | <7 | >8 |

* The values shown in this table are by necessity generalized to the entire population of individuals with diabetes. Patients with co-morbid disease, the very young, older adults, and others with unusual conditions or circumstances may warrant different treatment goals. These values are for nonpregnant adults. "Additional action suggested" depends on individual patient circumstances. Such actions may include enhanced diabetes self-management education, co-management with a diabetes team, referral to an endocrinologist, change in pharmacological therapy, initiation of or increase in SMBG, or more frequent contact with the patient. A1C is referenced to a nondiabetic range of 4.0-6.0% (mean 5.0%, SD 0.5%).

† Measurements of capillary blood glucose.

**IV. Glycated Hemoglobin (A1C)**

A. Indicates blood glucose control over a period of approximately 3 months.
B. Normal range varies depending on method lab uses; usually 4-7%, correlating to average blood glucose of 60-150mg/dl (-3.3-8.3 mmol/l).
C. Should be ordered by health care provider every 3 months for type 1 diabetes and 3-6 months for type 2 to help determine overall control.
D. Patient does not need to be fasting to have this blood test performed.

**V. Fructosamine Test (Glycated Serum Protein [GSP])**

A. Reflects blood glucose control over preceding 7-10 days.
B. May be used as a means of monitoring women during pregnancy, when more frequent determinations of control are essential.

**VI. Urine Ketone Testing**

A. Ketones: by-product of fat metabolism; presence indicates body is not metabolizing food properly because of lack of available insulin or carbohydrate; may indicate impending or established diabetic ketoacidosis (DKA), a condition that requires immediate medical attention.
B. Method: Ketone strips
   1. Strips are read by comparing the test color to a standard color chart.
   2. Factors such as handling the color pad with your hands or placing test materials on a counter recently cleaned with bleach can cause inaccurate results
   3. Be aware of expiration dates; the strips are good only for a specified time, usually 3–6 months. When a bottle of strips is opened, date it and note expiration date.

C. When to Test
   1. When blood glucose level is consistently >240mg/dl (13.3 mmol/l)
   2. Before exercise. Do not exercise if blood glucose is >240 mg/dl and ketones are present.
   3. During periods of acute illness (illness is a stress that can cause hyperglycemia)
   4. When symptoms of hyperglycemia accompanied by nausea, vomiting, and abdominal pain are present.

Here are additional resources you might find useful:

- "Diabetes in Children A Resource Guide for School Personnel", 2002, Illinois Department of Human Services. http://www.iasn.org/diabetes.pdf
- National Institutes of Diabetes and Digestive and Kidney Diseases (NIDDK), Hypoglycemia: http://www.diabetes.niddk.nih.gov/dm/pubs/hypoglycemia

Adapted from: Ballard AM, 2000. *Monitoring Glucose Control*. The Diabetes Ready-Reference Guide for Health Care Professionals. American Diabetes Association.©

# Recommended Guidelines for Blood Glucose Control

Students with diabetes need to obtain a blood glucose level and to respond to the results as quickly and conveniently as possible. This is important to avoid medical problems being worsened by a delay in testing/treatment and to minimize educational problems caused by missing instructions in the classroom.

To maximize instructional time, a student should be allowed to check his or her blood glucose level and take appropriate action to treat hypoglycemia. This applies to the classroom or anywhere the student is in conjunction with a school activity, if preferred by the student and indicated in the student's Individualized Health Plan. However, some students prefer to test their blood glucose in private and their privacy should be respected.*

See the table below for Recommended Guidelines for Blood Glucose Control. Blood glucose values less than 90 are considered low and should be monitored. When you schedule appointments with your physicians or your dietitian, remember to bring a logbook containing two weeks of blood glucose values to each appointment.

The "Take Action" column implies a possible insulin or food adjustment. We recommend keeping a log of three to five days of blood glucose values to identify a pattern of consistent high blood glucose before calling for an insulin adjustment. If blood glucose is consistently low, call for an insulin adjustment.

Dietitians recommend reviewing food intake and carbohydrate counting skills to make sure inconsistent eating is not the cause of varying blood glucose values. Checking food portions with measuring cups is helpful.

Remember, unless you are on Multiple Daily Injections (three shots per day) or an Insulin Pump, you should have a consistent carbohydrate meal plan to follow.

Summer exercise and activities may also influence blood glucose. A rule of thumb is to take one extra carbohydrate (15 grams) for each 30-45 minutes of more strenuous activity in addition to the current meal plan.

* Source: "Diabetes Care in the School and Day Care Setting". *Diabetes Care*, Volume 27, Supplement 1, Pages S122-S128, January 2004.

**Recommended Guidelines for Blood Glucose Control**

**NOTE:** Ranges may vary according to individual needs

| | **Plasma Monitor Values** | | **Whole Blood Monitor Values** | |
|---|---|---|---|---|
| **When** | **Goal BG** | **Take Action**: If BGs are out of range 2-3 days in a row | **Goal BG** | **Take Action**: If BGs are out of range 2-3 days in a row |
| **Before meals (Kids 5 years and older)** | 90-130 | Less than 90 or greater than 150 | 80-120 | Less than 80 or greater than 140 |
| **Kids under 5 years** | 100-200 | Less than 100 or greater than 200 | 100-200 | Less than 100 or greater than 200 |
| **2 hrs after meals (MDI or Pumps)** | Within 40 of premeal BG but less than 180 | If less than or greater than 40 of premeal BG | Within 40 of premeal BG but less than 180 | Less than or greater than 40 of premeal BG |

Adapted from: "Shot Talk" produced by Children's Mercy Hospital & Clinics, The Children's Diabetes Center – Summer, 2001

Proper interpretations of A1C test results requires that health care providers understand the relationship between test results and average blood glucose, kinetics of the A1C test, and specific assay limitations. Data from the Diabetes Control and Complications Trial (DCCT) relating A1C test results to mean plasma glucose levels appear in Table 1, but this data should be used with caution if the A1C test assay method is not certified as traceable to the DCCT reference method.

**Table 1. Correlation Between A1C Level and Mean Plasma Glucose Levels**

| | Mean Plasma Glucose | |
|---|---|---|
| A1C (%) | mg/dl | mmol/l |
| 6 | 135 | 7.5 |
| 7 | 170 | 9.5 |
| 8 | 205 | 11.5 |
| 9 | 240 | 13.5 |
| 10 | 275 | 15.5 |
| 11 | 310 | 17.5 |
| 12 | 345 | 19.5 |

Source: American Diabetes Association, Diabetes Care, Volume 26, Supplement 1, January 2003.

## Blood Glucose Monitors

Below is a list of Blood Glucose Monitors. For a complete list of Blood Glucose Monitors and Data Management Systems, please visit the American Diabetes Association's 2004 Resource Guide at: http://www.diabetes.org/uedocuments/monitors-tables.pdf

| Plasma Meters | | |
|---|---|---|
| Accu-Check Active | BD latitude Diabetes | Presitge IQ |
| Accu-Check Advantage | BD Logic | Presige LX |
| Accu-Check Compact | FreeStyle | Precision Sof-Tact |
| Accu-Check Complete | FreeStyle Flash | Precision Xtra |
| Accu-Check Voicemate | FreeStyle Tracker | QuickTek |
| Ascensia Breeze System | Hypoguard Advance | Supreme II |
| Ascensia DEX 2 | OneTouch InDuo | TrueTrack Smart System |
| Ascensia Elite | OneTouch SureStep | |
| Ascensia Elite XL | OneTouch Ultra | |
| Assure | OneTouch UltraSmart | |
| Assure II | Focus Blood Glucose Montoring System | |

| Whole Blood Meters | | | |
|---|---|---|---|
| One Touch Profile | One Touch Basic | One Touch II | ReliOn |

Adapted from: *Diabetes Forecast,* 2004 Resource Guide, Volume 57, Number 1, Pages RG 40-47.

# From The School Nurse
## Subject: Diabetes

Diabetes is **NOT** an infectious disease. It results from failure of the pancreas to make a sufficient amount of insulin. Without insulin food cannot be used properly. Diabetes currently cannot be cured but can be controlled. Treatment consists of daily injections of insulin and a prescribed food plan. A student with diabetes can participate in all school activities and should not be considered different from other students.

Low blood sugar occurs when the amount of sugar in the blood is too low. This is caused by an imbalance of insulin, too much exercise, or too little food. Under these circumstances the body sends out numerous warning signs. If any of the following warning signs are recognized, the student should be encouraged to report them.

**WARNING SIGNS OF LOW BLOOD SUGAR**

| | | |
|---|---|---|
| Excessive Hunger | Blurred Vision | Poor Coordination |
| Perspiration | Irritability | Abdominal Pain or Nausea |
| Weak Pallor (pale skin) | Crying | Inappropriate Actions/ Responses |
| Headache | Confusion | |
| Dizziness | Inability to Concentrate | |
| Nervousness or Trembling | Drowsiness or Fatigue | |

If the student is able to walk, please send him/her to the office accompanied by another student who can identify him/her to office personnel. If the student is unable to walk, please send for the nurse or an administrative assistant. The person who is sent for help should give the name of the student and the suspected problem.

Students with diabetes follow a prescribed diet and may select their foods from the school lunch menu or bring their own lunch. A midmorning and/or mid-afternoon snack may be necessary to help avoid low blood sugar.

The amount of sugar in the blood of a student with diabetes can be tested with special equipment. Testing the blood for sugar several times a day serves as an effective guide to proper diabetes control. Blood tests for sugar should be made before meals, and time should be allowed before lunch for the student who has diabetes to perform this test if requested.

The student with diabetes should be carefully observed in class, particularly before lunch. It is best not to schedule physical education just before lunch; and if possible, the student should not be assigned to a late lunch period. Many students require nourishment before strenuous exercise. Teachers and nurses should have sugar or carbohydrate available at all times. The student with diabetes should also carry a sugar or carbohydrate supply and be permitted to treat a reaction when it occurs.

Diabetic coma, a serious complication of the disease, results from uncontrolled diabetes. This does **NOT** come on suddenly and generally need not be a concern to school personnel.

Adapted from: “Diabetes Management in the School Setting”, 1998, Missouri Association of School Nurses.

# National Association of School Nurses

**Position Statement**

## *Blood Sugar Monitoring in the School Setting*

**HISTORY:**

Numerous students with diabetes attend school and require monitoring procedures to obtain/maintain optimal blood sugar levels. Blood glucose monitoring utilizes a drop of blood touched to a test strip and a meter that reads and displays a current level of blood glucose. Medical studies show that management of near normal glucose levels will prevent and slow the development of diabetes complications. The National Association of School Nurses (NASN) supports self-management of diabetes, while considering the individual status of each student.

**DESCRIPTION OF ISSUE:**

Each student with diabetes is unique in regard to his or her disease process, developmental and intellectual abilities, and required level of assistance with blood sugar monitoring. Academic productivity may be impaired if a student with diabetes is unable to monitor blood sugar levels promptly on an "as needed" basis in the least restrictive educational setting. NASN recognizes that the Occupational Safety and Health Administration (OSHA) regulations on bloodborne pathogens should apply to the school setting and all school personnel should adhere to local policies regarding these regulations.

**RATIONALE:**

Timely blood sugar monitoring and prompt intervention may prevent life threatening diabetic emergencies, in particular, hypoglycemic episodes. The school nurse is qualified to determine what level of assistance is required to competently perform, interpret, and intervene in blood sugar monitoring. Easy access to blood sugar monitoring at any given time is encouraged within the school setting.

**CONCLUSION:**

It is the position of the National Association of School Nurses that school nurses supervise the management and treatment of blood sugar monitoring within the school setting. The school nurse, parent, student, and health care provider should evaluate the self-management of blood sugar monitoring on a case-by-case basis. An individual health care plan including an emergency plan should be written by the school nurse and maintained for all students with diabetes. Training in recognizing symptoms of abnormal blood sugar levels should be provided to appropriate school staff. Direction may include assistance by staff with the blood sugar monitoring procedure, recording of results, and intervention as ordered by the student's health care provider.

School districts must establish direction in handling episodes of low blood sugar in students and staff members. State laws, nurse practice acts, and district policies may determine where the monitoring procedure will occur and may specify other staff members' ability to assist with the procedure. These determinations should be done on a case-by-case basis, taking into consideration student safety, proximity of the student's classroom to the health room, and the availability of the school nurse and other appropriately trained staff.

**References/Resources:**


1. American Diabetes Association (2001). Care of children with diabetes in the school and day care setting. *Diabetes Care*, 24(supplement 1) S108-112.
2. Gerber, M.V., Kalb, K.M., Luehr, R.E., Miller, W.R., Silkworth, C.K., & Will, S.I. (1993) *The school nurse's source book of individualized health care plans*. North Branch, MN: Sunrise River Press.
3. Grabeel, J. (1997) *Nursing Practice Management: Compendium of Individualized Healthcare Plans* Scarborough, ME: NASN
4. Hootman, J. (1996) *Quality nursing interventions in the school setting: Procedures, models, and guidelines*. Scarborough, ME: NASN
5. KinderCare Settlement Agreement Re: Diabetes Finger-Prick Tests (1996) www.usdoj.gov:80/crt/ada/kinder1.htm
6. Roche Diagnostics (1998) *Accu-Check Blood Glucose Monitor & Test Strips Users Manual* Indianapolis, IN
7. Individuals with Disability Education Act (IDEA) and Section 504 of the Rehabilitation Act of 1973 *School Bill of Rights for Children with Diabetes*


Adopted: June 2001

# Treatment of Low Blood Sugars

1. A low blood sugar level is an **emergency that needs to be treated immediately**. Without treatment, a low blood sugar may progress to unconsciousness and convulsions.

2. Low blood sugars can be prevented by:
   - **Extra** snacks for extra activity (consult exercise guide and/or dietitian)
   - Eating immediately after taking insulin if the blood sugar is <100 mg/dl
   - Eating an **extra snack** of carbohydrate and protein if the blood sugar is <120 mg/dl at bedtime
   - Replacing carbohydrates in the meal plan with things like regular soda or regular popsicles **ON SICK DAYS**

3. Treatment should be given whenever the blood sugar drops below 90 mg/dl or symptoms are present.

4. Notify parent or guardian when treatment is necessary due to low blood sugar.

| SYMPTOMS | TREATMENT |
|---|---|
| **MILD**<br>Irritibility<br>Shakiness<br>Sweating<br>Fast heart rate<br>Pale skin<br>Dizziness<br>Hunger | **QUICK-ACTING SUGAR**<br>• 15 grams of carbohydrate<br>• **See treatment guide by age on page 97.**<br>• **If not better in 15 minutes, repeat treatment.**<br>• **If the next meal or snack is more than 30 minutes away, give an extra snack of carbohydrate and protein.** |
| **MODERATE**<br>Confusion<br>Poor coordination<br>Behavior change<br>Slurred speech<br>Weakness<br>Headache | **INSTANT GLUCOSE/CAKE FROSTING (GEL)**<br>• Insert tube between gum and cheek.<br>• Administer appropriate amount.<br>• If no response in 15 minutes, administer glucagon.<br>• If the next meal or snack is more than 30 minutes away, give an **extra snack** of carbohydrate and protein. |
| **SEVERE**<br>Unconsciousness<br>Seizures<br>Inability to swallow | **GLUCAGON**<br>• Administer Glucagon as directed.<br>• **Call paramedics.**<br>• **Phone diabetes doctor on call.**<br>• **Feed as soon as possible after awakening.** |

Adapted from: "Diabetes Management in the School Setting", 1998, Missouri Association of School Nurses.

# Carbohydrates for Treatment of Low Blood Sugar Management

- The following table contains correct amounts of carbohydrate for treating low blood sugar in children. Amounts will vary according to age.
- Chocolate candy bars should NOT be used in the treatment of low blood sugar because they are high in fat content. Fat causes digestion to be slower so that sugar does not enter the cells as fast as other choices.
- Low fat or 2% milk is a good choice (especially during the night if the next meal is more than about 30 minutes away) because it also contains protein and some fat which will help keep the blood sugar in target range.
- If the next meal or snack is more than 30 minutes away, the fast-acting sugar should be followed by an extra snack consisting of a bread and a meat.

| ITEM | 5 YEARS OF AGE AND YOUNGER (5-10 grams) | 6-10 YEARS OF AGE (10-15 grams) | 10 YEARS OF AGE AND OLDER (15-20 grams) |
|---|---|---|---|
| B-D Glucose Tablets (large) (3 tabs = 15 grams) | 1-2 tablets | 2-3 tablets | 3-4 tablets |
| Dextrotabs, Dextrasol Tabs (small) (7 tabs = 15 grams) | 3-4 tablets | 5-6 tablets | 7-8 tablets |
| Glucose Gel (31 gram tube) | 1/6-1/3 tube | 1/3-1/2 tube | 1/2-2/3 tube |
| Cake icing (small tube) (1 teaspoon = 4 grams | 2 teaspoons | 3 teaspoons | 4-5 teaspoons |
| Honey, maple or Karo Syrup (1 teaspoon = 5 grams) | 1-2 teaspoons | 2-3 teaspoons | 3-4 teaspoons |
| Orange Juice (1/3 cup = 10 grams) | 1/4 -1/2 cup | 1/2 -3/4 cup | 3/4-1 cup |
| Apple Juice (1/3 cup = 10 grams) | 1/4 -1/2 cup | 1/2 -3/4 cup | 3/4 -1 cup |
| Table Sugar (1 teaspoon = 4 grams) | 2 teaspoons | 3 teaspoons | 4-5 teaspoons |
| Regular Soda (1 ounce = 3 grams) | 2-3 ounces | 4-5 ounces | 5-6 ounces |
| Raisins (1 tbsp = 7 ½ grams) | 1 tablespoon | 1 1/2 -2 tablespoons | 2 1/2 -3 tablespoons |
| Lifesavers (1 = 3 grams) | 2-3 | 4-5 | 5-7 |
| Milk-2% (8 ounces = 12 grams) | 4-5 ounces | 6-7 ounces | 8-10 ounces |

# DIABETES: LOW BLOOD SUGAR EMERGENCIES

MY NAME IS _____

I HAVE DIABETES AND MUST TAKE INSULIN DAILY.

**IF YOU SEE ME:**


**HUNGRY, WEAK**

**CRYING, CONFUSED**
**IRRITABLE**

**PALE**
**PERSPIRING**
**SHAKY**

**DROWSY**
**INATTENTIVE**

**HEADACHE**
**NAUSEA**

**OR BEHAVING**
**STRANGELY**
**IN**
**ANY WAY...**

I may be having a LOW BLOOD SUGAR EMERGENCY (insulin reaction).
My most common symptoms are _____

_____

A LOW BLOOD SUGAR EMERGENCY (insulin reaction) would most likely occur before lunch or after strenuous exercise or _____

_____

**IF THIS HAPPENS PLEASE GIVE ME SOME FORM OF SUGAR, SUCH AS:**

- SOFT DRINK (non-diet)
- CANDY OR HONEY
- SUGAR (at least 2 packets)
- FRUIT JUICE

Repeat if I do not improve in 5–10 minutes!

***Don't leave me alone, please.***

Follow up with additional food — such as milk, cookies, crackers.

I may need coaxing to eat.

But if I'm unconscious or unable to swallow, don't force drinking or eating — GET EMERGENCY HELP!

For additional help call:

PARENT _____ PHONE _____

PARENT _____ PHONE _____

DOCTOR _____ PHONE _____

***Please don't send me home alone when I've had a reaction.***

*(See reverse side)*

# Facts About Diabetes

1. A person who has Type 1 diabetes has to take insulin by injection at least once a day because he or she does not make enough of the hormone insulin to meet the body's needs. Without insulin, one's food cannot be properly metabolized.

2. Sometimes the balance between sugar and insulin in the body is upset. Then the person can have a LOW BLOOD SUGAR EMERGENCY (insulin reaction) This can occur at any time, but most frequently happens after:

   - Excessive physical activity, without extra food ahead of time
   - Failure to eat the proper amount at the proper time
   - Too much administered insulin

3. The symptoms of LOW BLOOD SUGAR EMERGENCY (insulin reaction) vary. Most young people with diabetes are aware when they need extra food. But there may be times when they may not be aware that a low blood sugar emergency is occurring. At that point you must be able to recognize the symptoms and offer the foods mentioned on the reverse side of this card.

4. On occasion, the youngster with diabetes may need to drink more water than usual and have to go to the bathroom more often than normally allowed. This is the result of high blood sugar, and you may want to alert the parents.

For additional copies and information:

Juvenile Diabetes Research Foundation International
Metro Saint Louis/Greater Missouri Chapter
225 S Meramec, Suite 400
St. Louis, Mo 63105
Ph: (314) 726-6778
www.jdrf.org

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The Juvenile Diabetes Foundation International was founded in 1970 by parents of children with diabetes who were convinced that diabetes could be cured through research. They were and still are determined to make that cure happen in their children's lifetime.

JDF is the world's leading nonprofit, nongovernmental funder of diabetes research. JDF's mission is to find a cure for diabetes and its complications through the support of research. For more information, visit our website: www.jdf.org.

*(See reverse side)*

Novo Nordisk DIABETES Care

# HYPOGLYCEMIA
## (Low Blood Glucose)

**Causes:** Too little food, too much insulin or diabetes medicine, or extra activity.

**Onset:** Sudden, may progress to insulin shock.

## SYMPTOMS

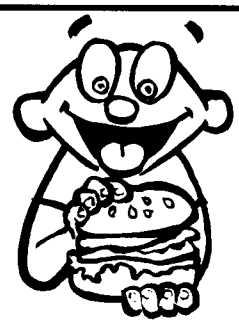

SHAKING

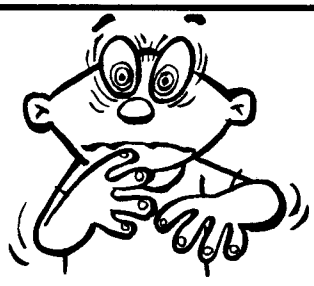

FAST HEARTBEAT


SWEATING


DIZZINESS


ANXIOUS


HUNGER

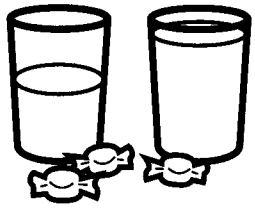

IMPAIRED VISION

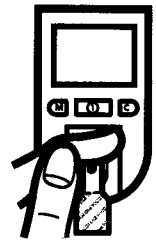

WEAKNESS FATIGUE

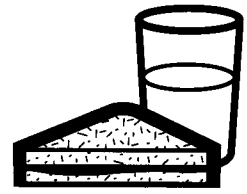

HEADACHE


IRRITABLE

## WHAT CAN YOU DO?


Drink 1/2 glass of juice or regular soft drink, or 1 glass of milk, or eat some soft candies (not chocolate).


Within 20 minutes after treatment TEST BLOOD GLUCOSE. If symptoms don't stop, call your doctor


Then, eat a light snack (1/2 peanut butter or meat sandwich and 1/2 glass of milk).

Treatment may vary with different medications.

Concept developed by Rhoda Rogers, RN, BSN, CDE, Sunrise Community Health Center, Greeley, Colorado

000-114 Printed in U.S.A.

Novo Nordisk DIABETES Care

# HIPOGLICEMIA

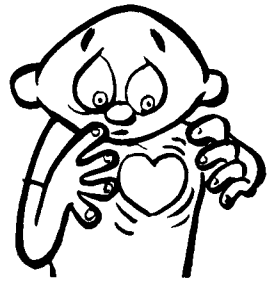
## (Bajo Nivel de Glucosa en la Sangre)

**CAUSAS:** Muy poca comida, demasiada insulina o medicina oral de diabetes, o mucho ejercicio

**COMIENZA DE REPENTE:** Puede progresar a reacción de insulina

## SÍNTOMAS

TEMBLOR

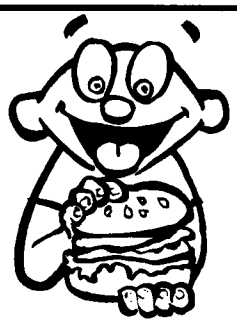


PULSO ACELERADO

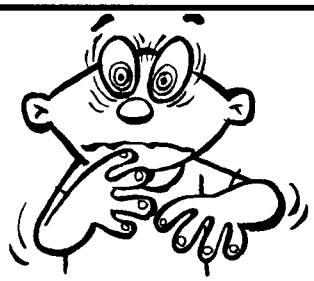
SUDOR

MAREO

ANSIEDAD



HAMBRE



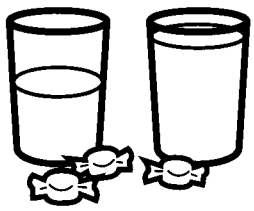
VISION BORROSA

DEBILIDAD CANSANCIO

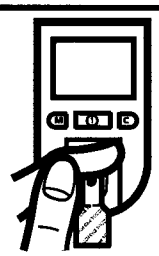
DOLOR DE CABEZA

IRRITABILIDAD

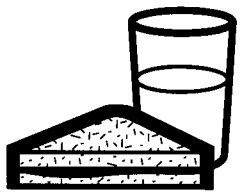
## ¿QUE PUEDE HACER?



Si usted tiene estos síntomas, beba 1/2 taza de jugo o una taza de leche, o coma varias cucharaditas de azúcar.



Dentro de 20 minutos, PRUEBE EL AZUCAR EN LA SANGRE. Si los síntomas no han parado, llame al médico.



Si los síntomas han parado, ingiera una comida pequeña. Pruebe el azúcar en la sangre otra vez.

El tratamient podría variar usando diferentes medicamentos.

Novo Nordisk DIABETES Care

# HYPERGLYCEMIA
## (High Blood Glucose)

**Causes:** Too much food, too little insulin or diabetes medicine, illness or stress.

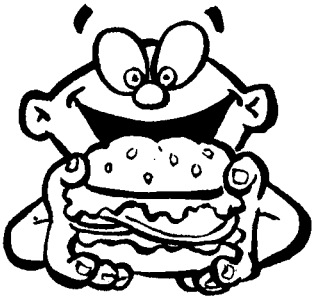
**Onset:** Gradual, may progress to diabetic coma.

## SYMPTOMS

EXTREME THIRST


FREQUENT URINATION

DRY SKIN



HUNGER

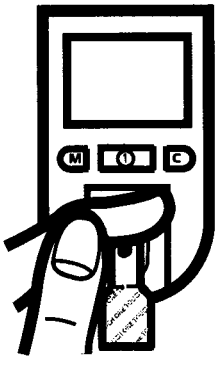
BLURRED VISION


DROWSINESS

DECREASED HEALING

## WHAT CAN YOU DO?

TEST BLOOD GLUCOSE



If over 200 mg/dL for several tests or for 2 days

CALL YOUR DOCTOR

Concept developed by Rhoda Rogers, RN, BSN, CDE, Sunrise Community Health Center, Greeley, Colorado

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Novo Nordisk DIABETES Care

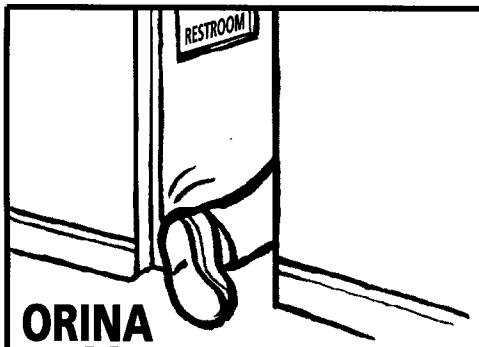
# HIPERGLICEMIA
## (Exceso de Glucosa en la Sangre)

**CAUSAS:** Mucha comida, muy poca insulina, enfermedad o nervios.

**COMIENZA GRADUAL:** Puede progresar a un coma diabético.

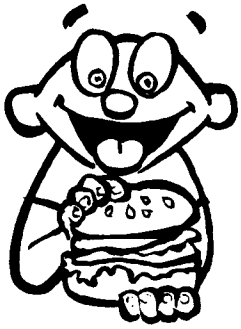
## SÍNTOMAS

DEMASIADA SED




ORINA CON FRECUENCIA

PIEL SECA



HAMBRE

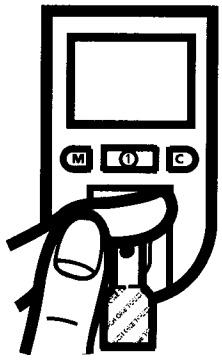
VISION BORROSA


SUEÑO

LAS HERIDAS NO SE SANAN

## ¿QUE PUEDE HACER?

PRUEBE EL AZÚCAR EN LA SANGRE



Si mas de 200 mg/dL para varias pruebas o por 2 dias

LLAME AL MÉDICO

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# What is Glucagon?

Glucagon is used to raise the blood sugar when a child is unable to take liquid or food by mouth because of severe sleepiness, unconsciousness, or seizure activity. Glucagon must be injected with a syringe into the skin, like insulin. It is a hormone, which helps the liver to release sugar to raise the blood sugar.

**When Do You Use Glucagon?**
When the child has low blood sugar (usually below 20mg/dl) and is unable to take liquid or food by mouth because of severe sleepiness, unconsciousness, or seizure activity.

**What You Need**

- 2 Glucagon Emergency Kits. You will need a prescription to purchase the kits at a pharmacy. It is recommended you have one for home and one for school.
- Use of glucagon should be part of a child's Individualized Health Plan and be supplied to the school by the family with accompanying physician order.

**When Possible, Check Blood Sugar Before and/or After Giving Glucagon.**
**To Inject Glucagon:**

- Glucagon is now available as recombinant DNA in a kit containing the glucagon powder in a vial and the diluent in a glucagon syringe.
- Remove the seal from the bottle of glucagon in the kit (the small vial/bottle containing a white powder/pellet).
- Inject the liquid in the syringe into the bottle of glucagon.
- Remove syringe from the bottle of glucagon, shake the bottle gently until the glucagon dissolves (looks clear).
- Draw-up the solution in the bottle with the correct size syringe based on the weight of the child.
- The glucagon syringe is marked with only 2 dosages 0.5 mg and 1.0 mg. The recommended dose of glucagon to inject is*:
  - –0.5 mg for a child 50 pounds or under
  - 1.0 mg for a child over 50 pounds
- Inject glucagon in the same manner as insulin injections.
- Keep the child lying on their side in case of vomiting.
- If the child does not respond, call 911.
- Once the child is awake give a snack such as cheese and crackers.

**NOTE***:* It is common for the child to vomit or feel nauseous after receiving glucagon. Keep glucagon at room temperature in a central location in the home. Inform other caregivers of the location.

When possible, practice drawing up glucagon with an expired kit. Check the date of glucagon kits on a regular basis. Discard if past the expiration date. Obtain a refill immediately.

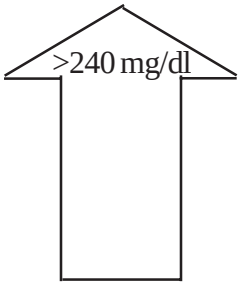
** dosage recommendations from glucagon manufacturer*

Adapted from: "Children with Diabetes: A Resource Guide for Schools", 2001, New York State Department of Health

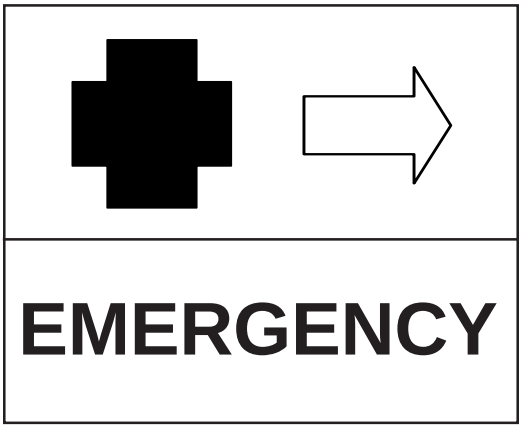
# Treatment of High Blood Sugars

**These are only recommendations. Follow orders as prescribed by the student's physician.**

1. If the blood sugar level is >240 mg/dl, check urine ketones regardless of how the child feels.




2. If **URINE KETONES** are negative to small:
   * Have the child drink 8-12 ounces/hour of caffeine-free, sugar-free, noncaloric fluids such as water, diet soda
   * Recheck blood glucose and urine for ketones in 2-3 hours
   * Repeat above as needed




3. If **URINE KETONES** are moderate to large, call for help immediately
   * This may mean the child needs extra insulin **NOW**
   * **Call parent or guardian immediately.**
   * **If parent or guardian cannot be reached and student is vomiting and unable to take fluids by mouth, call emergency personnel for transport to the emergency room.**

**NOTE:** The school health nurse or personnel should review the Emergency Action Plan to determine what the school and parent(s)/guardian(s) had agreed upon as the first step when dealing with the situation once ketones have been detected. If the Emergency Action Plan identifies the child is to be given insulin immediately, then do so; otherwise, follow the steps on the Emergency Action Plan.

Symptoms of high blood sugar may include:

- Lack of appetite
- Blurred vision
- Difficulty in breathing
- Fruity odor of breath or urine
- Dry mouth
- Mental sluggishness, slowness to respond
- Nausea, vomiting, stomach pain
- Dry or flushed skin
- Weakness
- Intense thirst
- Frequent urination

Adapted from: "Diabetes Management in the School Setting", 1998, Missouri Association of School Nurses, "Diabetes in Children A Resource Guide for School Personnel", 2002, Illinois Department of Human Services, http://www.iasn.org/diabets.pdf.